INSTRUCTION AND OPERATING MANUAL

THE MOSELEY

AUTOGRAF

trade mark

RETURN TO
AEROSPACE DIV.

F. L. MOSELEY CO.

409 NO. FAIR OAKS AVENUE, PASADENA, CALIFORNIA

PRELIMINARY
OPERATING AND MAINTENANCE
MANUAL
for
MODELS 135 and 135R

RETURN TO
AEROSPACE DIV.

February 1961

F. L. Moseley Co., 409 N. Fair Oaks Ave., Pasadena, California

SECTION I - DESCRIPTION

A. GENERAL DESCRIPTION

The AUTOGRAF Models 135 and 135R are designed to plot cartesian coordinate graphs from DC electrical information. They will also plot functions of time and operate with a variety of Moseley AUTOGRAF accessories. The Models 135 and 135R open at each end of the recording platen for ease in loading the standard 8 1/2" x 11" chart paper. An integral vacuum system holddown grips the paper firmly in place. The two axes are controlled by identical self-balancing servo mechanisms mechanically and electrically independent and isolated from ground. The resulting relative motion of the two servo mechanisms traces a cartesian coordinate graph of the relationship on the paper.

The major components of the Model 135 AUTOGRAF are unitized and assembled in a form to provide maximum flexibility and ease of maintenance. The control unit is modular in construction and is mounted immediately to the right of the recording platen. Sixteen calibrated voltage ranges, from a minimum of 0.5 millivolts/inch to 50.0 volts/inch, may be selected for each axis. When calibrated spans are not required, a stepless potentiometer may be switched into the input circuit, increasing the total span and permitting arbitrary voltages to be confined within the limits of the graph paper. Maximum input, however, must never exceed 500 volts.

The sweep selector is combined with the X axis voltage selector with voltage plotting or time base operation determined by the position of the associated function switch. On the Y axis function selector, a position is provided for potentiometric input with 0.5 millivolts/inch pen deflection. Zero controls on each axis permit one full scale of zero suppression and full scale zero set without distrubing the basic calibration.

While extremely versatile in its application to normal two axis plotting requirements, the Model 135 is not designed to be equipped with digital accessories or curve followers.

B. SPECIFICATIONS

Recording Speed:	One-half second for full scale pen travel, each axis.
Paper size:	8 1/2" x 11" standard graph paper; integral vacuum holddown.
Input Voltage Ranges:	Sixteen calibrated ranges for each axis: 0.5, 1, 2, 5, 10, 20, and 50 millivolts/inch; 0.1, 0.2, 0.5, 1, 2, 5, 10, 20, and 50 volts/inch.
Time Intervals:	Seven calibrated sweeps of 0.5, 1, 2, 5, 10, 20, and 50 seconds per inch. Operates on X axis.
Input Resistances:	200,000 ohms per volt on ranges through 1.0 volts/inch; 2 megohms on all higher ranges.
Accuracy:	Better than 0.2% of full scale. Resetability better than 0.1% of full scale. Time sweep accuracy: better than 5% of full scale.
Power Requirements:	115 volts, 60 cps, approximately 100 watts. Other voltages and frequencies available on special order.
Physical Dimensions:	Overall size: 10 1/2" high, 16 1/8" wide, 4 1/2" deep. Weight: approximately 20 pounds.

B. SPECIFICATIONS

Recording Speed:	One-half second for full scale pen travel, each axis.
Paper size:	8 1/2" x 11" standard graph paper integral vacuum holddown.
Input Voltage Ranges:	Sixteen calibrated ranges for each axis: 0.5, 1, 2, 5, 10, 20, and 50 millivolts/inch; 0.1, 0.2, 0.5, 1, 2, 5, 10, 20, and 50 volts/inch.
Time Intervals:	Seven calibrated sweeps of 0, 5, 1, 2, 5, 10, 20, and 50 seconds per inch. Operates on X axis.
Input Resistance:	200,000 ohms per volt on ranges through 1.0 volts/inch; 2 megohms on all higher ranges.
Accuracy:	Better than 0.25% of full scale. Resolability better than 0.1% of full scale. Time sweep accuracy better than 5% of full scale.
Power Requirements:	115 volts, 60 cps, approximately 100 watts. Other voltages and frequencies available on special order.
Physical Dimensions:	Overall size: 10 1/2" high, 16 1/8" wide, 4 1/2" deep. Weight approximately 20 pounds.

SECTION II - OPERATION

A. RECORDING

For operation of the AUTOGRAF, the data to be recorded must be reduced to a DC current and have voltage amplitudes within the scale ranges of the recorder. The input must vary at a rate within the response capabilities of the instrument. The AUTOGRAF may be placed into operation as follows:

1. Connect the power cord to a 115 volt, 60 cycle line and turn the unit on by moving the Vacuum-Power Switch to the "Off-Standby (SBY)" position. For optimum performance, the third prong of the power cord must be grounded. To assure adequate ventilation for the servo amplifiers, operate the Model 135 only when supported by its carrying handle placed in its lowered position.

2. Place the Operate-Pen Switch into the "On-Up" position.

3. Place the recording paper onto the recording platen and align with the left and lower edges of the platen.

4. Place the Vacuum-Power Switch into the "On-On" position, energizing the servo system and starting the vacuum pump. Smooth the paper on the platen as required. Data may now be run through its range and the pen will move across the paper. As the pen is still in its raised position, no trace will be made on the paper.

5. The Range Switches and Zero Potentiometers are set as required. Place ink in the pen reservoir. Do not completely fill the reservoir.

6. The Operate-Pen Switch is placed in the "On-On" position, lowering the pen to the paper so that a recording may be made.

7. When no recording is needed but recorder readiness is necessary, place the recorder in its Standby condition to save wear on the rebalance potentiometers and lower power dissipation and heating effects.

B. TIME BASE

For operation with the X axis as a Time Base, the above operations should be carried out. The X axis Function Switch should be placed into the Time position. The X Range Selector Switch is placed into the proper position for the sweep speed desired. Recording is accomplished by placing the Sweep Switch into the "Start" position. This action will automatically lower the pen to the table and start the time sweep. When the sweep is over, return the Sweep Switch to the "Reset" position. The pen carriage will be automatically returned to the start position.

SECTION III - MAINTENANCE

A. CALIBRATION

The AUTOGRAF Model 135 and 135R recorders as shipped are standardized against a Weston Standard Cell. The instrument may be re-calibrated as follows:

Turn the recorder on and allow it to reach a stabilizing temperature. Turn the function switches to the DC volts position and adjust the zero setting controls to bring the pen and carriage indices into exact agreement with the "10" and "7" marks on the X/Y scales. Set the X/Y ranges to the 0.1 volts/inch position and the "fixed-variable" switch to the "fixed" position. Connect an accurately established 1 volt source with reverse polarity to the recorder X axis input terminals and 0.7 volts to Y terminals. The standardizing rheostats are then adjusted to bring the pen and carriage indices into exact agreement with the "0" mark on the X and Y scales. The standardizing rheostats are located beneath the control unit cover. Access to these controls is trhough the appropriately labeled holes in the cover. Adjustment is by screwdriver. When adjusted properly, remove the input and see if the pen and carriage move back to the initial position. Repeat adjustment if necessary.

B. GAIN ADJUSTMENT

Gain Control Potentiometers are located on the bottom of the recorder and may be adjusted as required by screwdriver.

1. Set gain control of one axis to a position as high as possible but with acceptable retrace capability of the recorder. Repeat for the other axis.

2. Check the servo for proper operation by rotating the zero control on the recorder control panel. If servo response is sloppy and not precise, increase the gain to eliminate this. Repeat for each axis.

3. Generally, an optimum setting of the gain controls will be found to produce essentially zero retrace when a test signal is introduced into the recorder to draw a record over and back on the same line.

C. VACUUM PUMP MAINTENANCE

Ordinarily the vacuum pump assembly should require no maintenance. However, if the pump should stop working properly, do not disassemble since proper assembly is rather difficult. First check all hose couplings for leakage, then try flushing with carbon tetrachloride or similar solvent. To flush, remove the recording table, and, with the pump running, apply solvent to the intake with an eye dropper. If the pump still does not operate, please arrange to have the pump returned to the factory for repair.

D. OPERATION WITH POTENTIOMETER TYPE INPUT

For maximum sensitivity with minimum current drain from the signal source, the Model 135 and Model 135R may be operated with potentiometric input.

In the Y axis only, potentiometric input is available by placing the Function Switch into the "Pot" position. If this form of input is required in the X axis, a buss wire on the X axis attenuator circuit is removed, disconnecting the input attenuators from the circuit. The buss wire to be removed is colored red for ease in identification. The buss wire is located within the Control Box on the X axis function board near the X attenuator. When used in this manner, the range switch must be placed in its most sensitive position, (i.e., 0.5 millivolts/inch.

MODEL 135 RESTRINGING INSTRUCTIONS

GENERAL

To restring the Model 135 AUTOGRAF Recorder's Y axis, the recording platen must be removed from the instrument. When restringing the X axis, in addition to the recording platen, the bottom or amplifier section must also be removed from the instrument.

RESTRINGING THE MODEL 135 X AXIS

In restringing the X axis of the Model 135 Recorder, it is recommended that the following procedure be used:

1. Use the following material

   a. Seven strand steel stringing cable, 1/64" diameter, Moseley Part No. 294-0001.

   b. Cable crimps
   Moseley Part No. 380-0115

   Note: It is recommended that free use be made of masking tape to hold the cable in place as the following steps are made.

2. Place the Y carriage assembly at some convenient location and fasten with tape or clamps so that it is perpendicular to the X axis and will not move.

3. Make a small loop in one end of a piece of stringing wire at least 4.5 feet long; fasten with a cable clamp.

4. Attach loop to the left hand arm of the upper tension spring, Point A. String cable to the right and around Pulley C to the drive pulley and clutch assembly, Point D. Point E is the X axis drive motor shaft spline.

5. Make two turns around the drive pulley, D, in a counterclockwise direction, proceeding from the inboard edge to the outboard.

6. Continue on and around the right arm of the lower tension spring, Point F.

7. Make sure there is no crossover of cable around Pulley D. Tighten the cable just installed and fasten with a cable clamp at F. To make the attachment of cables at Points G and F, the Model 135 must be placed upside-down.

8. Make a small loop in a second piece of drive cable at least 4.5 feet long and fasten with a cable clamp.

9. Attach the loop to the right hand arm of the upper cable tension spring, Point B. String cable to the left around Pulleys I and J, as indicated in Figure 1.

10. Continue on and around the left hand arm of the lower cable tension spring G.

11. Tighten the cable and fasten with a cable clamp at G. To fasten this cable, the Model 135 should be placed upside-down.

Note: The tension required in these cables is not excessive. Too much tension will cause retrace problems. The tension should be just sufficient to take some tension on the cable tension springs. The tension on each cable should be, as nearly as possible, the same.

RESTRINGING THE MODEL 135 Y AXIS

Power is transferred from the servo motor to the pen carriage by a belt and pulley assembly attached to the pantograph arm. These drive belts are Moseley Part No. 209-0001-3.

The replacement of these drive belts is obvious. Installation is made most easily from the rear of the instrument.

Nylon Drive Cord Replacement

To replace the nylon drive cord, proceed as follows:

1. Cut 19" of Y axis nylon drive cord, Moseley Part No. 233-0013.

2. Feed one end around the Y drive pulley (upper pulley) from the right side. Feed through enough cord to fasten to the pen mounting block stud.

3. Fasten the other end of the cord to the tension spring, Moseley Part No. A-5961. Attach the other end of the spring to the pen mounting block stud.

4. Slip bottom of cord coil around Y axis idler pulley (lower pulley).

5. Check tension. The spring should be stretched slightly to keep tension on the strung axis.

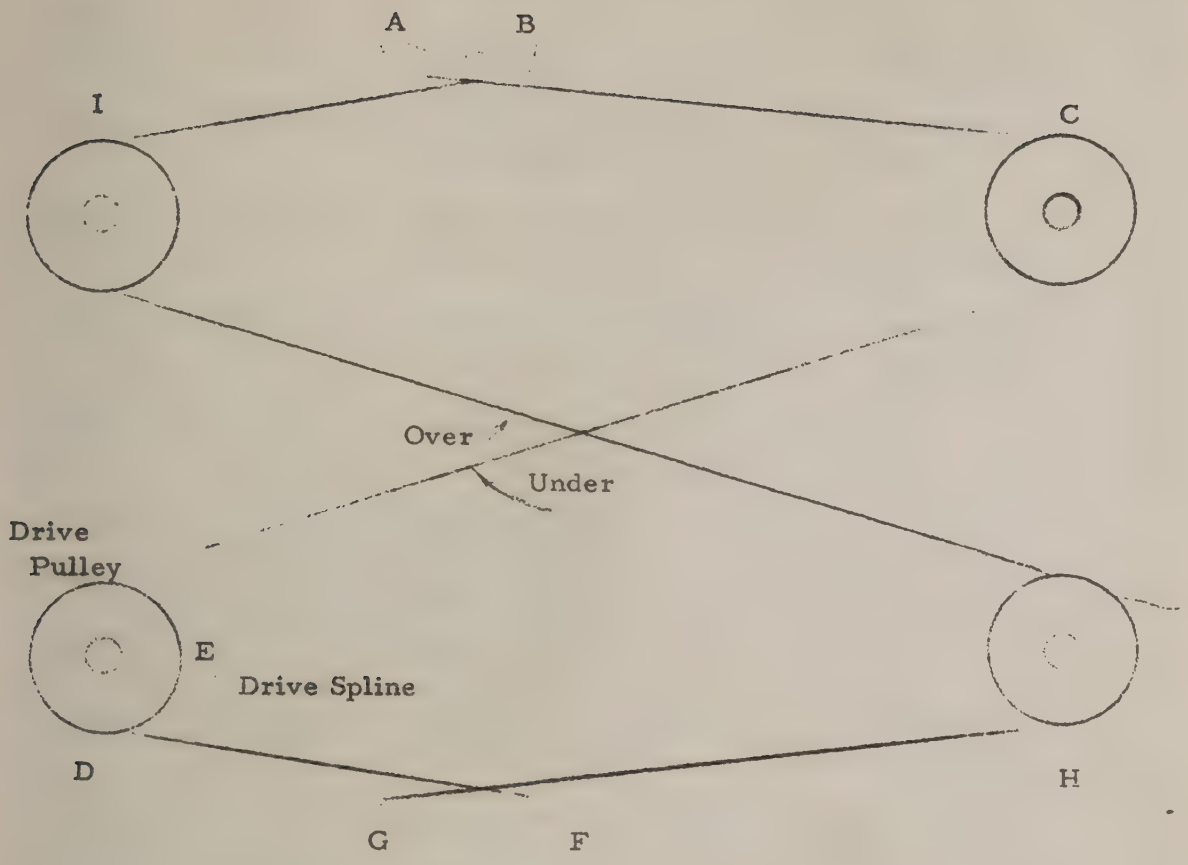


Figure 1. X Axis Cabling Diagram (Top View)

PARTS LIST

MODELS 135 AND 135R

Circuit Symbol	Moseley Part No.	Description	Mfr./Mfrs. Designation
C-101, C-102	235-0008	Capacitor, tantalum 3.6 mfd/60 V	Fansteel F-115
C-103	235-0003	Capacitor, tantalum 5 mfd/50 V	Fansteel PP5B50A1
C-104	234-0007	Capacitor, metallized .01 mfd/200 V	Aerovox Type P83Z
C-201, C-202		Same as C-101	
C-203		Same as C-103	
C-204		Same as C-104	
C-205		Same as C-103	
C-206	234-0011	Capacitor, metallized .02 mfd/200 V	Aerovox Type P83Z
C-207		Same as C-104	
C-301A, C-301B	233-0019	Capacitor, paper .0022 mfd/100 V	C-D Miniroc STM1D22
C-302A, C-302B	231-0081	Capacitor, electrolytic 30 mfd/6 V	Aerovox PWE-6030
C-303A, C-303B	231-0080	Capacitor, electrolytic 4 mfd/12 V	Sprague TE-1123
C-304A, C-304B		Same as C-303	
C-305A, C-305B	234-0038	Capacitor, metallized .22 mfd/100 V	C-D WMF1P22E
C-306A, B thru C-309A, B		Same as C-303	

Circuit Symbol	Moseley Part No.	Description	Mfr./Mfrs. Designation
C-310A, C-310B	234-0036	Capacitor, metallized .47 mfd/100 V	C-D WMF1P47E
C-311A, C-311B	234-0035	Capacitor, metallized .1 mfd/100 V	C-D WMF1P1E
C-312A, C-312B		Same as C-311	
C-313A, C-313B	231-0079	Capacitor, electrolytic 40 mfd/150 V (NP)	Aerovox PRS7450
C-316A, C-316B	234-0037	Capacitor, metallized .047 mfd/100 V	C-D WMF1S47E
C-317A, C-317B		Same as C-316	
C-401, C-402	231-0073	Capacitor, electrolytic 200 mfd/15 V	Sprague TE-1164
C-403, C-404	231-0066	Capacitor, electrolytic 100 mfd/25 V	Sprague TE-1211
C-405	231-0009	Capacitor, electrolytic 250 mfd/50 V	Sprague TVA-1312
C-406	231-0067	Capacitor, electrolytic 1500 mfd/50 V	Sprague TVL-1341
C-407	234-0030	Capacitor, metallized 4 mfd/400 V	Electron D4-405
C-501A, C-501B		Same as C-403	
CH-101	221-0007	Chopper	Stevens-Arnold BA-11-11
CR-401, CR-402	252-0024	Diode, 1N756	Texas Instruments

Circuit Symbol	Moseley Part No.	Description	Mfr. / Mfrs. Designation
CR-403, CR-404	252-0017	Diode, 1N1513	International Rectifier
CR-405 thru CR-408	252-0033	Diode, 1N3193	R. C. A.
CR-409 thru CR-412	252-0032	Bridge Rectifier	Texas Instruments
CR-413	254-0002	Diode, selenium 80 V, 1.5 MA	International Rectifier 4U1
CR-501A, CR-501B	252-0028	Diode, 1N429	Hoffman
CR-502A, CR-502B		Same as CR-403	
CR-503A, CR-503B	252-0021	Diode, T12G	Transitron
CR-504A, CR-504B		Same as CR-503	
F-101	331-0053	Fuse, 2 amp	Bussman 3AG
J-101 thru J-105	316-0041	Connector	Amphenol 57-20140
J-109	346-0026	Jack, remote pen Tini-jack	Switchcraft #41
K-401	A-8695	Pen Lift Solenoid	Moseley
M-301A, M-301B	227-0017	Servo motor	Diehl
M-401	A-8728	Vacuum motor	Moseley

Circuit Symbol	Moseley Part No.	Description	Mfr. / Mfrs. Designation
P-101 thru P-105	316-0047	Connector	Amphenol 57-10140
P-106	296-0007	Power cord, removable	Belden PH151/CS9941/ PH104/7.5
R-101	243-0018	Resistor, precision, w.w. 1 K, .1%	Cinema 410E
R-102	243-0281	Resistor, precision, w.w. 2 K, .1%	Cinema 410E
R-103	243-0093	Resistor, precision, w.w. 6 K, 1/4 W, .1%	Cinema 410E
R-104	243-0026	Resistor, precision, w. w. 10 K, .1%	Cinema 410E
R-105	243-0090	Resistor, precision, w.w. 20 K, 1/4 W, 1%	Cinema 410E
R-106	243-0282	Resistor, precision, w.w. 60 K, .1%	Cinema 410E
R-107	243-0028	Resistor, precision, w.w. 100 K, .1%	Cinema 410E
R-108	243-0146	Resistor, precision, w.w. 200 K, .1%	Cinema 410E
R-109	243-0147	Resistor, precision, w.w. 600 K, .1%	Cinema 410E
R-110	243-0101	Resistor, precision, w.w. 1 meg., 1/2 W, .1%	Resistron PW-1
R-113	243-0280	Resistor, precision, w.w. 999.5 ohm, .1%	Cinema 410E
R-114	243-0010	Resistor, precision, w.w. 249.87 ohm, .1%	Cinema 410E

Circuit Symbol	Moseley Part No.	Description	Mfr. / Mfrs. Designation
R-115	243-0011	Resistor, precision, w.w. 111.06 ohm, .1%	Cinema 410E
R-116	243-0285	Resistor, precision, w.w. 52.61 ohm, .1%	Cinema 410E
R-117	243-0012	Resistor, precision, w.w. 20.39 ohm, .1%	Cinema 410E
R-118	241-0139	Resistor, composition 510 ohm, 1/4W, 5%	Allen-Bradley
R-119	241-0138	Resistor, composition 300 ohm, 1/4W, 10%	Allen-Bradley
R-120	241-0137	Resistor, composition 100 ohm, 1/4W, 10%	Allen-Bradley
R-121	241-0136	Resistor, composition 47 ohm, 1/4W, 10%	Allen-Bradley
R-122	241-0135	Resistor, composition 22 ohm, 1/4W, 10%	Allen-Bradley
R-123		Same as R-101	
R-124	241-0163	Resistor, composition 2.7 K, 1/4W, 10%	Allen-Bradley
R-125	241-0164	Resistor, composition 360 ohm, 1/4W, 5%	Allen-Bradley
R-126	236-0020	Potentiometer, non-precision 1 K	Allen-Bradley JU-1021, SDZ024
R-127 thru R-130	241-0158	Resistor, composition 470 ohm, 1/4W, 10%	Allen-Bradley
R-131	242-0090	Resistor, precision carbon 1 K, 1/8W, 1%	Key EM-60
R-132	242-0092	Resistor, precision carbon 1.1 meg., 1/8W, 1%	Key EM-60

Circuit Symbol	Moseley Part No.	Description	Mfr. / Mfrs. Designation
R-133	241-0165	Resistor, composition 56 K, 1/4W, 10%	Allen-Bradley
R-134	241-0181	Resistor, composition 390 K, 1/4W, 10%	Allen-Bradley
R-135	241-0182	Resistor, composition 4.7 meg., 1/4W, 10%	Allen-Bradley
R-136A, R-136B	236-0047	Potentiometer, non-precision 5 K, Tandem, 10%, dual shaft	Chicago Tel. Co. Type C2-252
R-137		Value selected at factory	
R-138	236-0043	Potentiometer, non-precision 400 ohm	Clarostat 43-400
R-139	A-8694	Y-axis slidewire 3.5 K	Moseley
R-201		Same as R-101	
R-202		Same as R-102	
R-203		Same as R-103	
R-204		Same as R-104	
R-205		Same as R-105	
R-206		Same as R-106	
R-207		Same as R-107	
R-208		Same as R-108	
R-209		Same as R-109	
R-210	243-0101	Resistor, precision, w.w. 1 meg., 1/2W, .1%	Resistron PW-1
R-212		Same as R-113	

Circuit Symbol	Moseley Part No.	Description	Mfr. / Mfrs. Designation
R-213		Same as R-114	
R-214		Same as R-115	
R-215		Same as R-116	
R-216		Same as R-117	
R-218		Same as R-118	
R-219		Same as R-119	
R-220		Same as R-120	
R-221		Same as R-121	
R-222		Same as R-122	
R-223		Same as R-101	
R-224		Same as R-124	
R-225		Same as R-125	
R-226		Same as R-126	
R-227 thru R-229		Same as R-127	
R-230		Value selected at factory	
R-231		Same as R-127	
R-232	241-0148	Resistor, composition 3.3 K, 1/4W, 10%	Allen-Bradley
R-233 thru R-237	236-0059	Rheostat 1 K	Continental Wirt Type WC816B
R-238		Same as R-127	

Circuit Symbol	Moseley Part No.	Description	Mfr. / Mfrs. Designation
R-239	242-0083	Resistor, precision carbon 12 K, 1/2W, 1%	Aerovox CPS 1/2
R-240	241-0179	Resistor, composition 240 K, 1/4W, 10%	Allen-Bradley
R-241, R-242		Value selected at factory	
R-243		Same as R-131	
R-244		Same as R-133	
R-245, R-246	236-0065	Potentiometer, non-precision 100 K, clinch ear mtg.	Chicago Tel. Co. Type VPM-45
R-247		Same as R-232	
R-248	241-0167	Resistor, composition 39 K, 1/4W, 10%	Allen-Bradley
R-249A, R-249B		Same as R-136A, B	
R-250	241-0169	Resistor, composition 560 K, 1/4W, 10%	Allen-Bradley
R-251		Same as R-248	
R-252	242-0091	Resistor, precision carbon 760 K, 1/8W, 1%	Key EM-60
R-253		Same as R-138	
R-254		Value selected at factory	
R-255	241-0180	Resistor, composition 3.9 K, 1/4W, 10%	Allen-Bradley
R-256	A-8704	X-axis slidewire 5 K	Moseley
R-257, R-258	241-0145	Resistor, composition 1 K, 1/4W, 10%	Allen-Bradley

Circuit Symbol	Moseley Part No.	Description	Mfr./Mfrs. Designation
R-301A, R-301B	241-0144	Resistor, composition 820 K, 1/4W, 10%	Allen-Bradley
R-302A, R-302B	241-0149	Resistor, composition 22 K, 1/4W, 10%	Allen-Bradley
R-303A, R-303B	241-0185	Resistor, composition 5.6 K, 1/4W, 10%	Allen-Bradley
R-304A, B thru R-307A, B	241-0146	Resistor, composition 10 K, 1/4W, 10%	Allen-Bradley
R-308A, B R-309A, B	241-0186	Resistor, composition 220 ohm, 1/4W, 10%	Allen-Bradley
R-310A, B		Same as R-304A	
R-311A, R-311B	236-0063	Potentiomenter, non-precision 1 K	I. R. C. RQ11-108
R-312A, B thru R-320A, B		Same as R-304A	
R-321A, R-321B	241-0178	Resistor, composition 300 K, 1/4W, 5%	Allen-Bradley
R-322A, B		Same as R-257	
R-323A, B		Same as R-321A	
R-324A, B, R-325A, B		Same as R-121	
R-326A, R-326B	240-0052	Resistor, w.w. (non-precision) 1 ohm, 3 W	Sprague 151E
R-327A, B		Same as R-326A	
R-401, R-402	241-0068	Resistor, composition 330 ohm, 1/2W, 10%	Allen-Bradley

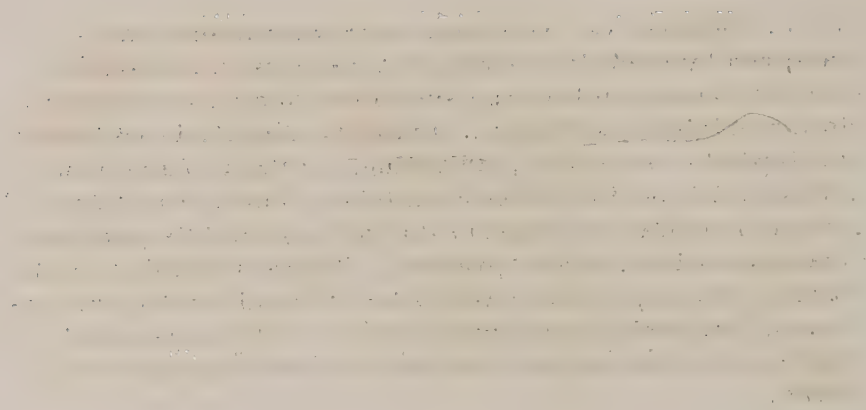
Circuit Symbol	Moseley Part No.	Description	Mfr./Mfrs. Designation
R-403, R-404	241-0005	Resistor, composition 22 ohm, 1/2W, 10%	Allen-Bradley
R-405, R-406	241-0189	Resistor, composition 120 ohm, 1/2W, 10%	Allen-Bradley
R-407	240-0023	Resistor, w.w. (non-precision) 270 ohm, 3W, 5%	Sprague 151E
R-408	240-0056	Resistor, w.w. (non-precision) 150 ohm, 5W	Sprague 27E
R-501A, B		Same as R-127	
R-502A, R-502B	241-0126	Resistor, composition 510 ohm, 1/2W, 5%	Allen-Bradley
T-301A, T-301B	204-0027	Transformer, input	Triad G40638
T-302A, T-302B	204-0028	Transformer, output	Microtran MT11-FB
T-401	202-0035	Transformer, power	Triad 68048
T-501	204-0026	Transformer, reference	Topaz #00837
TR-301A, TR-301B thru TR-306A, TR-306B	256-0022	Transistor 2N1370	Texas Instruments
TR-307A, TR-307B	256-0023	Transistor 2N1541	Motorola
TR-308A, TR-308B		Same as TR-307A	

Circuit Symbol	Moseley Part No.	Description	Mfr. / Mfrs. Designation
S-101	A-8712	Switch, Y-function	Moseley
S-102	A-8709	Switch, Y-attenuator	Moseley
S-103	261-0031	Switch Fixed-variable, DPDT	Oak 212548-78
S-201	A-8708	Switch, X-attenuator	Moseley
S-202	A-8710	Switch, X-function	Moseley
S-203		Same as S-103	
S-204	261-0029	Switch, lever	Switchcraft L 13036
S-205	261-0028	Switch, lever	Switchcraft L 13006
S-206	263-0008	Snap switch, 3 section	Microswitch 13AT32
V-301A	251-0030	Tube, vacuum Nuvistor	R. C. A. 7586

WARRANTY

F. L. Moseley Co. warrants each instrument manufactured by them to be free from defects in material and workmanship for a period of one year after delivery to the original purchaser. Liability under this warranty is limited to servicing, adjusting, or the replacement of defective parts, (other than tubes, fuses, or batteries) on any machine returned to the factory for this purpose, transportation charges prepaid. Before returning to the factory for any reason, notify us of the difficulty encountered, the model and serial number of the instrument, and we will furnish you with service or shipping instructions.

F. L. Moseley Co.
Pasadena, California



Y RANGE

X RANGE

J-101

P-101

J-110

SEE NOTE 3

R129 470

R130 470

R131 1K

R132 1.1M

C104 .01

R133 56K

R134 390K

R135 4.7M

R136A 5K

R136B 5K

R137 SEE NOTE 2

R138 400

R113 999.5

R114 240.87

R115 111.06

R116 52.61

R117 20.39

R119 300

R120 100

R121 47

R122 22

R123 1K

R124 2.7K

R125 300

BLK.

BLUE

GRN.

RED

CH-101

CHOPPER

J-104

T301A

T301B

TR302A 2N1370

TR303A 2N1370

TR305A 2N1370

TR306A 2N1370

TR307A 2N1541

TR308A 2N1541

P-105

J-105

X AXIS AMPLIFIER SAME AS ABOVE

X INPUT

R201 1K
R202 2K
R203 6K
R204 10K
R205 20K
R206 60K

R210 1 MEG

R212 999.5
R213 249.87
R214 111.06
R215 52.61
R216 20.39

R218 510
R219 300
R220 100
R221 47
R222 22

S-203-A
S-203-B
F
V

R224 2.7K
R226 1K
R223 1K
R225 360

SEE NOTE 1

MV
V
T
S-202-C

R231 470

R232 3.3K
R233 1K
R257 1K
R234 1K
R235 1K
R258 1K
R236 1K
R237 1K
R238 470

S-201-D
S-201-E

R239 12K

C204 30

S-202-D
C206 .04
R244 5K
R250 560K
R251 39K
C207 .015
R252 760K
R243 1K

S-202-H

R245 100K
A
B
R241 SEE NOTE 2
C205 5
R242 SEE NOTE 2
R246 100K

S-202-E

R253 400
R254 SEE NOTE 2
R255 3.9K

R247 3.3K
R249-A 5K
C
R248 39K
R249-B 5K

R240 240K
STBY-RESET

S-202-F

S-202-I

S-204-A
SWEEP

S-204-B

S-204-C
STBY
UP
PEN
DOWN

S-204-D
STBY
SERVO

S-204-E

S-204-F

S-206-A
OFF
SBY
ON
POWER

S-206-B
OFF
OFF
ON
VACUUM

S-206-C

S-206-D

J-109
REMOTE PEN

BLK.
WHT. RED
BLU.
GRN.
RED

Blue
Red
R256 5K 4-L

WHT. BLK.
WHT. GRN.
ORN.
WHT. YEL.
WHT. ORN.
WHT.
WHT. RED

P-103 J-103

M.		
	9-28-61	WAW

ADDED S-206-D
ADDED PIN #14 IN P-103
S-204-D WAS S-205-B
S-206-C WAS S-205A
ADDED S-204-E & S-204-F

R405 150 5W
+24
301A 12 10
301B 12 10

R402 330 0 +12
R404 22Ω
R406 120Ω
18V
117V
GREY
BLK.
RED
P-105 J-105

C405 250/50
R407 270 3W
+24
CR409 CR410
24V
C406 1500/50
CR411 CR412
1N-253 (4)
T401
-24
CR413 401
TO CHOPPER

WHT.
PEN COIL K401
RED
RED
GREY
GREY
WHT. GRN.
WHT. BRN.
WHT. BLK.

F-101 2A
P-106 115 VAC

NOTE:
1. BREAK CONNECTION FOR POT INPUT
2. VALUE SELECTED AT FACTORY
3. OPTIONAL REAR INPUT ONLY

D 9116

REVISIONS			
L	8-15-61	RDS	P-105-12 ADDED R-405 & R-406 WAS 27Ω R-206 WAS .02
K	7-25-61	Tolle	DELETED R-111 R-110 WAS 500 K
J	7-13-61	RDS	ADDED T-108 TR-307 AE TR-808 & WAS 814
H	6-30-61	RDS	R-111 WAS 10K R-208 WAS 3.3 R-209 WAS 3.3 R-404 WAS 3.9
G	6-26-61	Tolle	
F	6-20-61	Tolle	
E	6-14-61	RDS	ADDED NOTE 3
D	5-5-61	RDS	POWER SUPPLY REDESIGNED COMPONENT VALUES IN AMPLIFIER REVISED
C	4-6-61	RDS	
B	4-2-61	RDS	
A	3-23-61	RDS	

F. L. MOSELEY CO.
PASADENA CALIFORNIA

TOLERANCE UNLESS OTHERWISE SPECIFIED:
FRACTIONAL: ± 1/64 DECIMAL: ± .005 ANGULAR: ± ½°
REMOVE BURRS AND BREAK SHARP EDGES
DO NOT SCALE DRAWING - WORK FROM DIMENSIONS ONLY

TITLE: SCHEMATIC - MODEL 135

MAT'L:			
FINISH:			
DR: GE	2-28-61	SCALE:	
CKD:	2-28-61	DATE:	2-28-61
APPR: RDS	2-28-61	NEXT ASS'Y:	

USED ON: MODEL 135
PART NO.: D 9116
REV.: M

THE MOSELEY